WE CLAIM:

1. An image processor comprising:

an image detector for producing an image signal from an image received thereat;

oscillation means coupled to the image detector for inducing a spatial oscillation in the image relative to the image detector; and

a spatio-temporally matching filter in communication with the image detector and the oscillation means for providing enhanced image processing of the image, the matching filter being configured to filter out aspects of the image signal not associated with the induced oscillation.

2. The image processor according to claim 1, wherein the oscillation means is configured to induce the spatial oscillation via a swept-frequency sinusoid chirp.

3. The image processor according to claim 1, wherein the image detector comprises a primary detector array having detector elements for receiving the image, and a secondary detector array coupled to the primary detector array, the secondary detector array being configured to extract differential image information from the image.

4. The image processor according to claim 3, wherein the secondary detector array comprises a plurality of secondary detectors, the secondary detectors being grouped by spatial orientation of the detector elements.

5. The image processor according to claim 4, wherein the secondary detectors comprise opponent center/surround detectors, a central detector of each said opponent center/surround detector being configured to receive a signal input from one of the detector elements, and a surround detector of each said opponent center/surround detector being configured to receive a signal input of opposing polarity from an adjacent one of the detector elements.

6. The image processor according to claim 5, wherein the filter is configured to extract phase information of elements of the image crossing boundaries of the opponent center/surround detectors for providing at least one of increased spatial and motion accuracy of the image detector.

7. The image processor according to claim 5, wherein the filter is configured to detect Doppler frequency shifts of elements of the image crossing the opponent/center detectors for extracting real-time velocity information of the image elements.

8. The image processor according to claim 5, wherein the filter is configured to time instances of the image crossing boundaries of the opponent/center detectors during a motionless period of the detector for extracting one of real-time velocity information and position information of the image thereat.

9. The image processor according to claim 1, wherein the filter is configured to perform a first coarse analysis of the image, and subsequently a finer analysis of the image of edges detected by the first coarse analysis to provide improved imaging efficiency.

10. The image processor according to claim 1, wherein the filter is configured to extract real-time, systematic detector-to-detector sensitivity variation information to provide relative calibration of the detector elements.

11. The image processor according to claim 1, wherein the filter is configured to suppress between oscillation periods of the detector an output of those of the detector elements not reporting motion of the image during one of the oscillation periods, and to increase sensitivity of those of the detector elements reporting real motion of the image between the oscillation periods.

12. The image processor according to claim 1, wherein the filter is configured to extract spectra information sampled at various orientations and/or scales of textures exposed to the image detector.

13. The image processor according to claim 1, wherein the image detector includes a neutral density wedge surrounding the image detector for extending a dynamic range of the image detector.

14. The image processor according to claim 3, wherein the image detector is configured to control at least one of a sensitivity and an integration time of at least one of the detector elements for extending a dynamic range of the image detector.

15. The image processor according to claim 3, wherein the filter is configured to cancel output differences between adjacent ones of the detector elements during the oscillation of the image detector.

16. A method of image processing comprising the steps of:

providing a continuous image signal by spatially oscillating an image relative to an image detector; and

with reference to the spatial oscillation, filtering out aspects of the image signal not associated with the spatial oscillation.

17. The method according to claim 16, wherein the spatial oscillation step comprises spatially oscillating the image with a swept-frequency sinusoid chirp.

18. The method according to claim 16, wherein the filtering step comprises extracting differential image information from the image.

19. The method according to claim 18, wherein the image detector comprises a primary detector array having detector elements for receiving the image, and a secondary detector array coupled to the primary detector array for extracting enhanced contrast information from the image signal.

20. The method according to claim 19, wherein the secondary detector comprises a plurality of opponent center/surround detectors, and the filtering step comprises increasing at least one of spatial and motion accuracy of the image detector by extracting phase information of elements of the image crossing boundaries of the opponent center/surround detectors.

21. The method according to claim 19, wherein the secondary detector comprises a plurality of opponent center/surround detectors, and the filtering step comprises extracting real-time velocity information of the image by detecting Doppler frequency shifts of elements of the image crossing the opponent/center detectors.

22. The method according to claim 19, wherein the secondary detector comprises a plurality of opponent center/surround detectors, and the filtering step comprises extracting at least one of real-time position and velocity information of the image by timing instances of elements of the image crossing boundaries of the opponent/center detectors during a motionless period of the image detector.

23. The method according to claim 16, wherein the filtering step comprises providing improved imaging efficiency by performing a first coarse analysis of the image, and subsequently a finer analysis of the image of edges detected by the first coarse analysis.

24. The method according to claim 19, wherein the filtering step comprises calibrating the detector elements by extracting real-time, systematic detector-to-detector sensitivity variation information from the image signal.

25. The method according to claim 19, wherein the filtering step comprises suppressing between oscillation periods of the image detector an output of those of the detector elements reporting a static edge of the image during one of the oscillation periods, and increasing sensitivity of those of the detector elements reporting real motion of the image between the oscillation periods.

26. The method according to claim 16, wherein the filtering step comprises extracting at various orientations and/or scales spectra information associated with textures exposed to the image detector.

27. The method according to claim 16, wherein the filtering step comprises extending a dynamic range of the image detector using a neutral density wedge surrounding the image detector.